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Usage of tracks for jet energy reconstruction

- ❑ Step 1 : use tracks of the jet with impact in calo out of the reco cone due to 4T field (A.N.)
- ❑ Step 2 : use energy flow objects inside reco cone (Dan's energy flow in CMS)
- ❑ Step 3 : for overlapping clusters substruct expected responce of matched tracks and add Σp_t^{trk} of a such tracks (Irina's and Olga's way)

I've tested Step 1 with a single jets, no pile up :

- calorimeter simulation with cmsim122*
- MC track used*

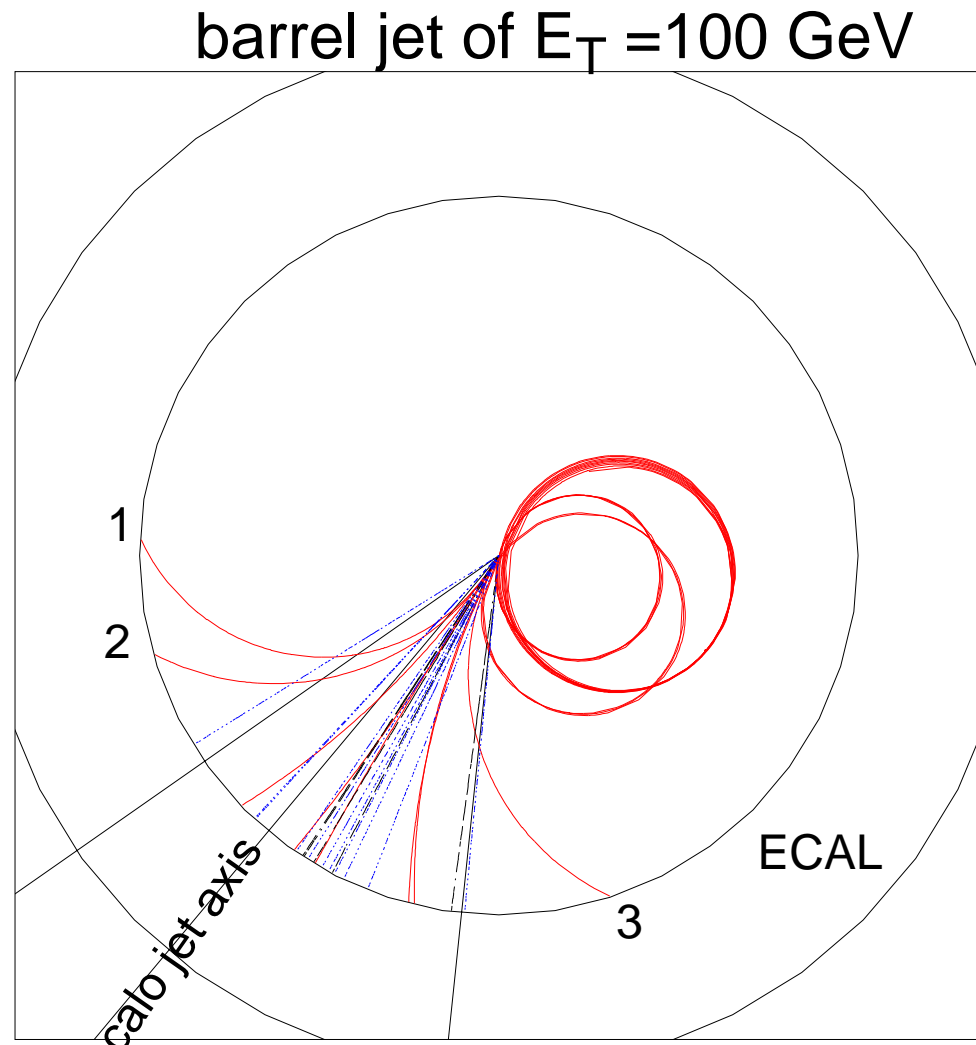


Step 1 : use tracks of the jet with impact in calo out of the reco cone (due to 4T field)

$$E_{T \text{ jet}} = E_{T \text{ jet}}^{\text{calo}} + p_{T \text{ trks}},$$

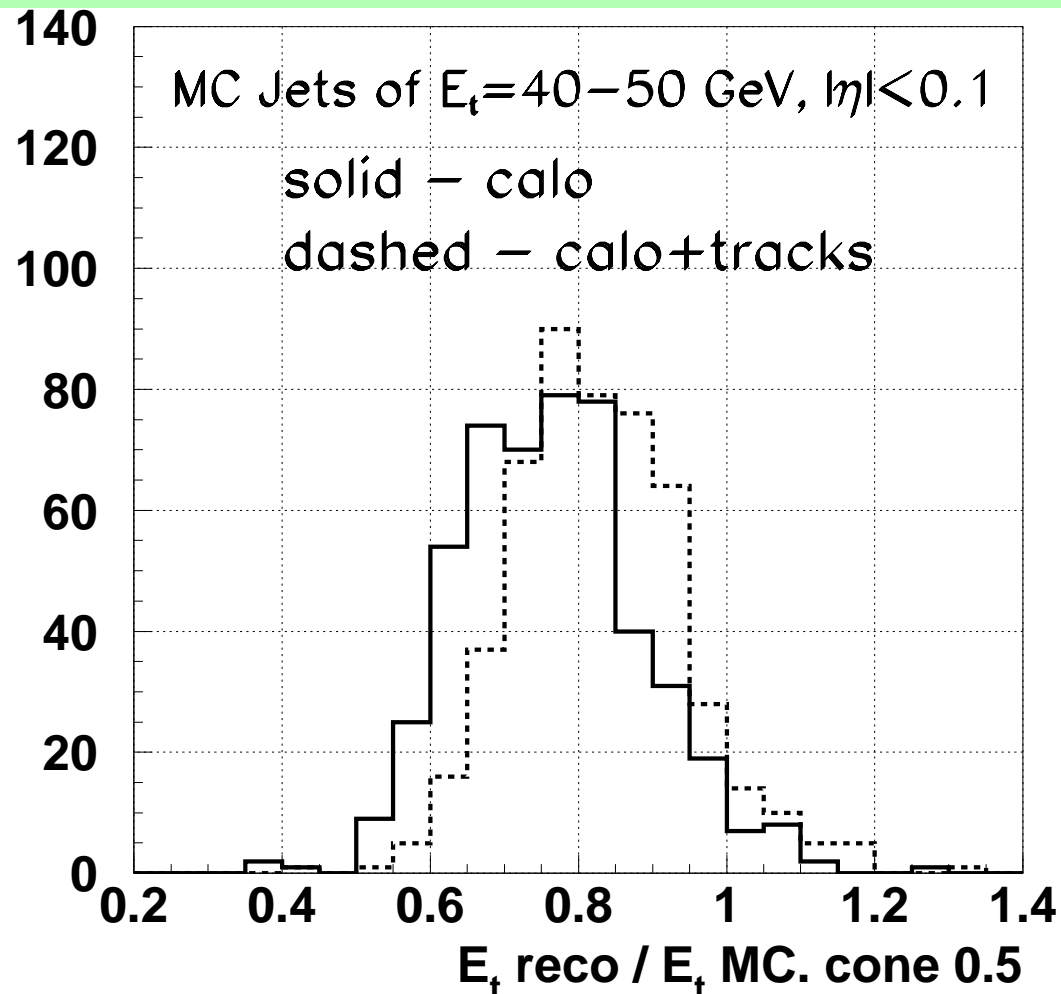
where $p_{T \text{ trks}}$ is a sum p_T of tracks of the jet with impact in ecal out of the reconstruction cone due to deflection in 4T field

in fig. it is tracks 1,2 & 3.

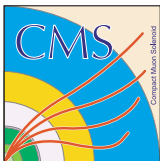




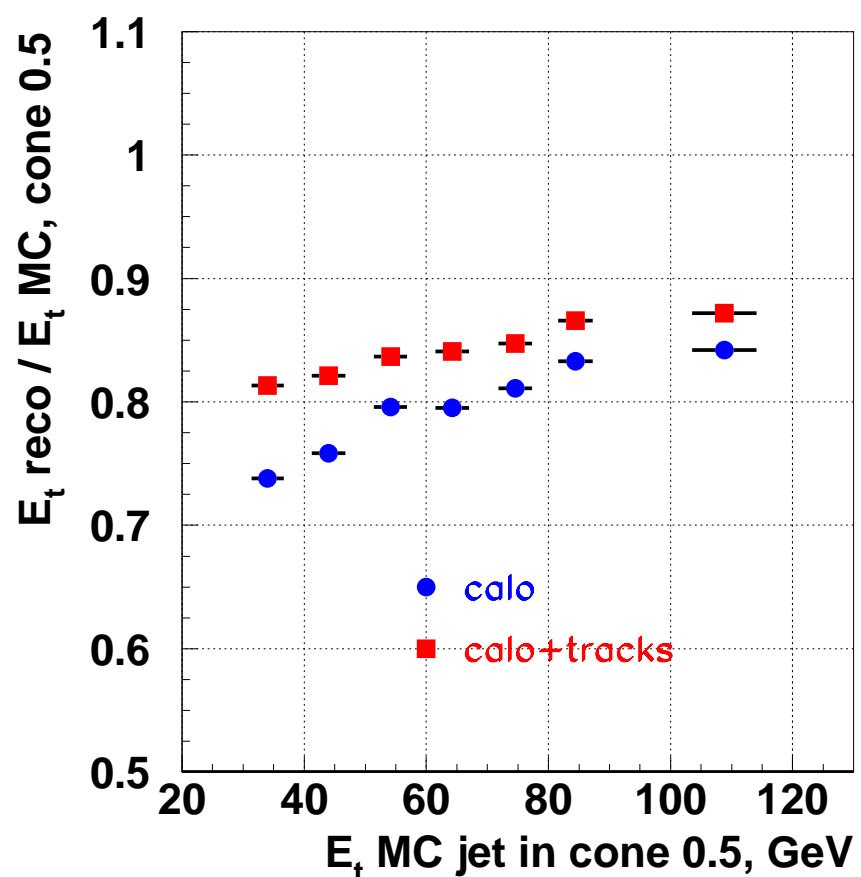
example how it works for jets of 40-50 GeV



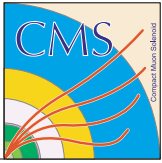
full information in the next slides



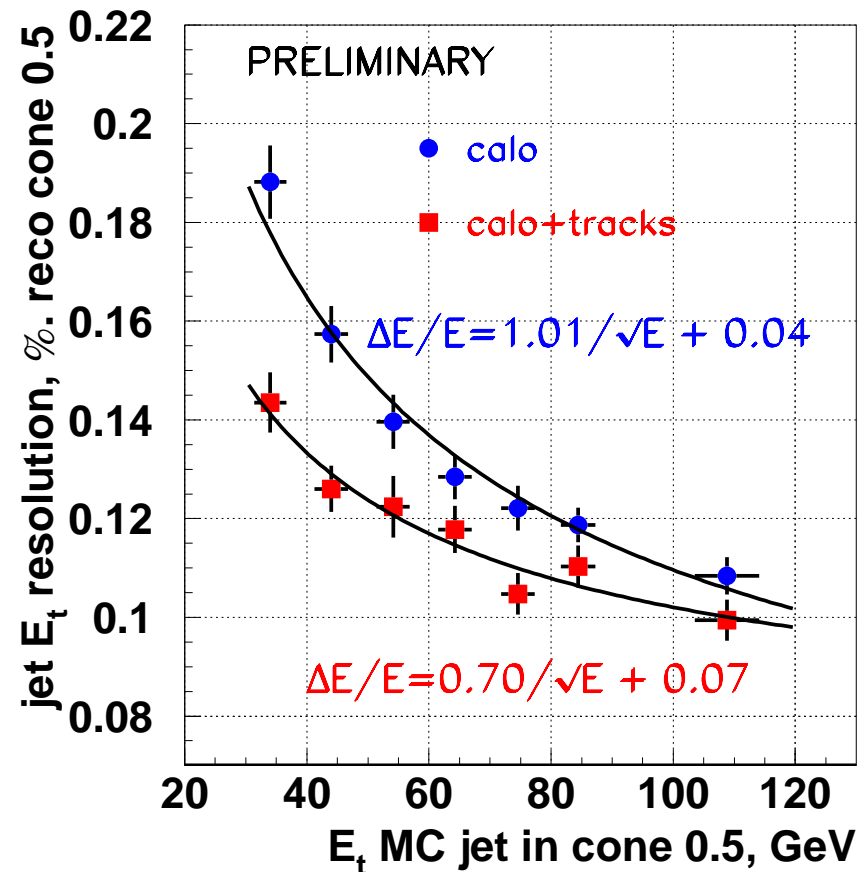
jet energy scale improved



what's about energy resolution ?



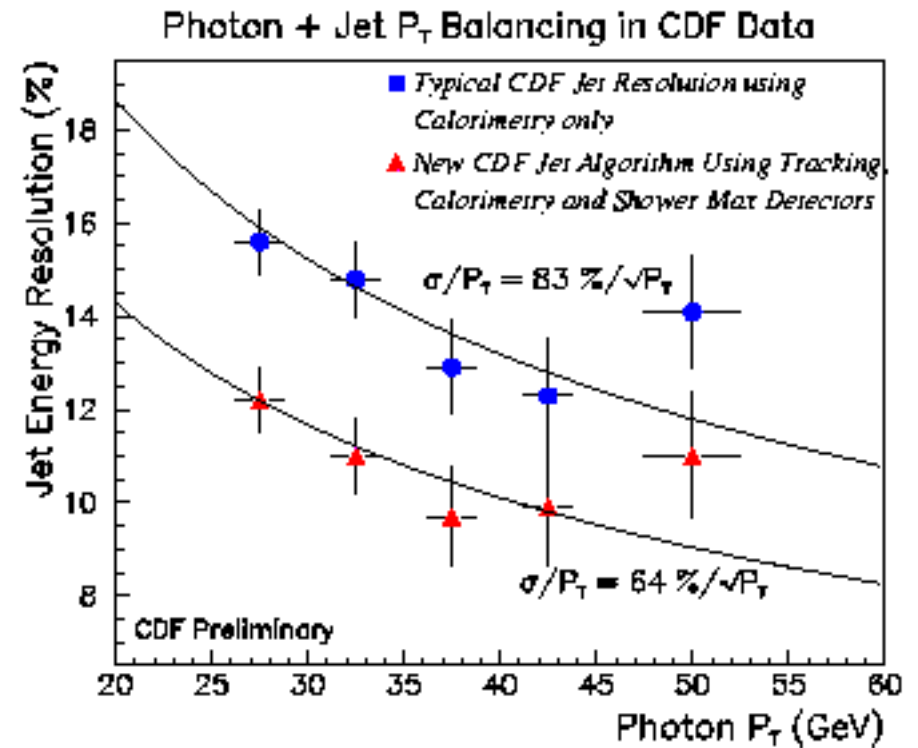
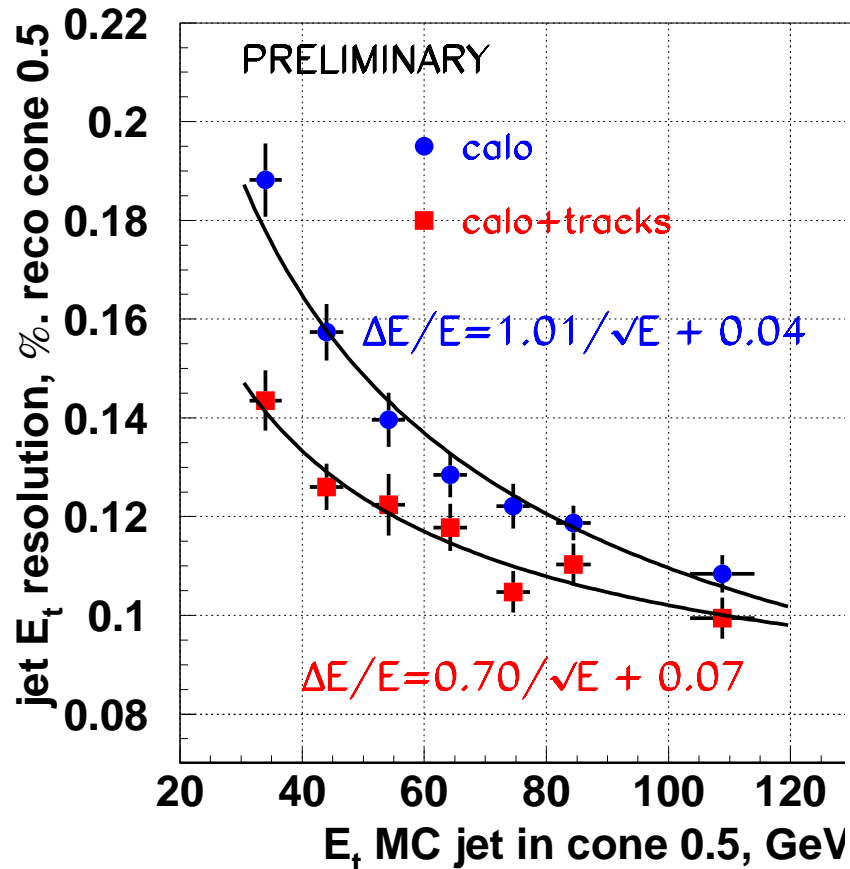
Energy resolution improved.



how it looks in comparizon with CDF ?



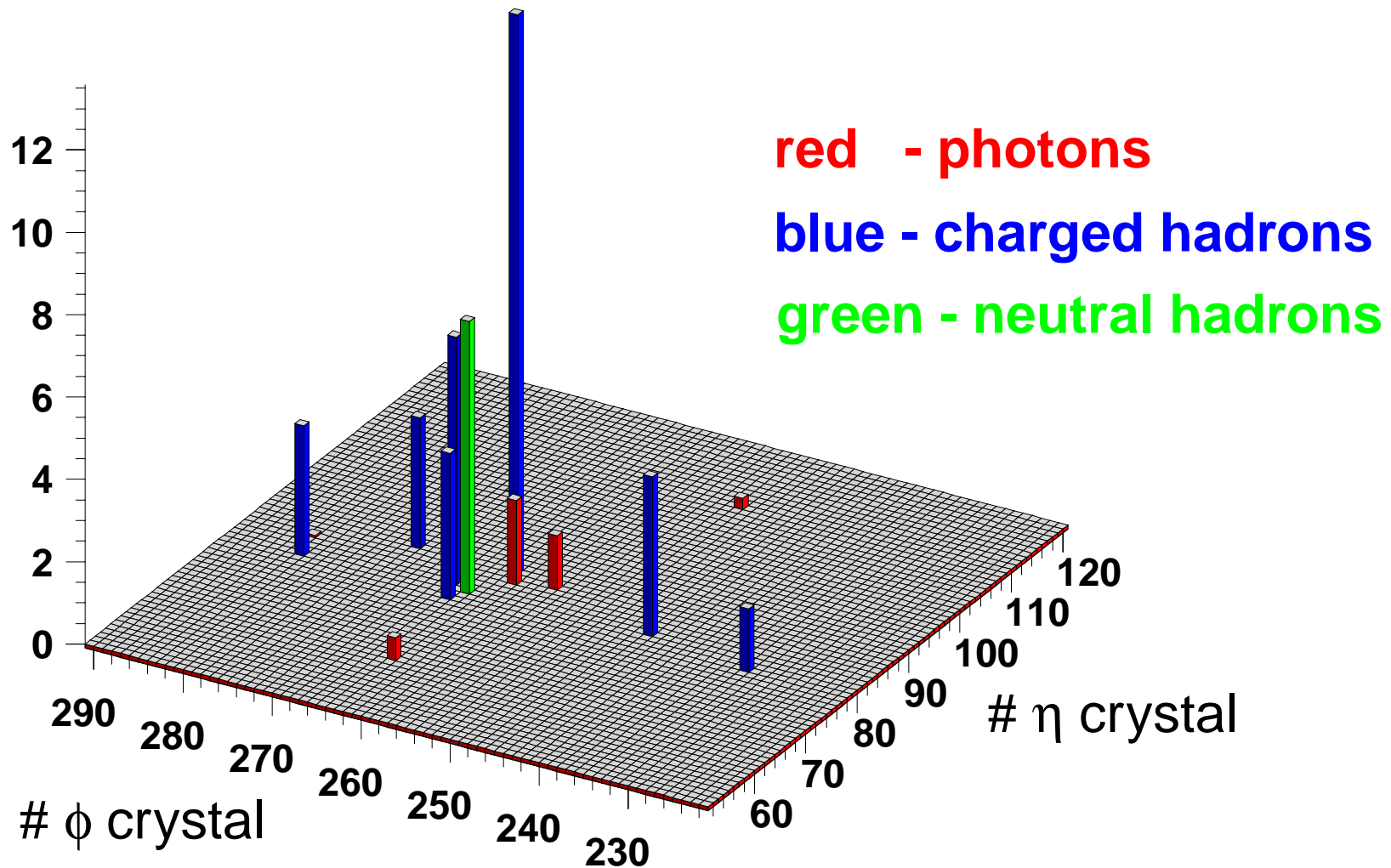
improvement in resolution is the same order as
in CDF for the low E_t jets



has to be checked with “real” reconstructed tracks
what’s about Step 2 (energy flow) ?

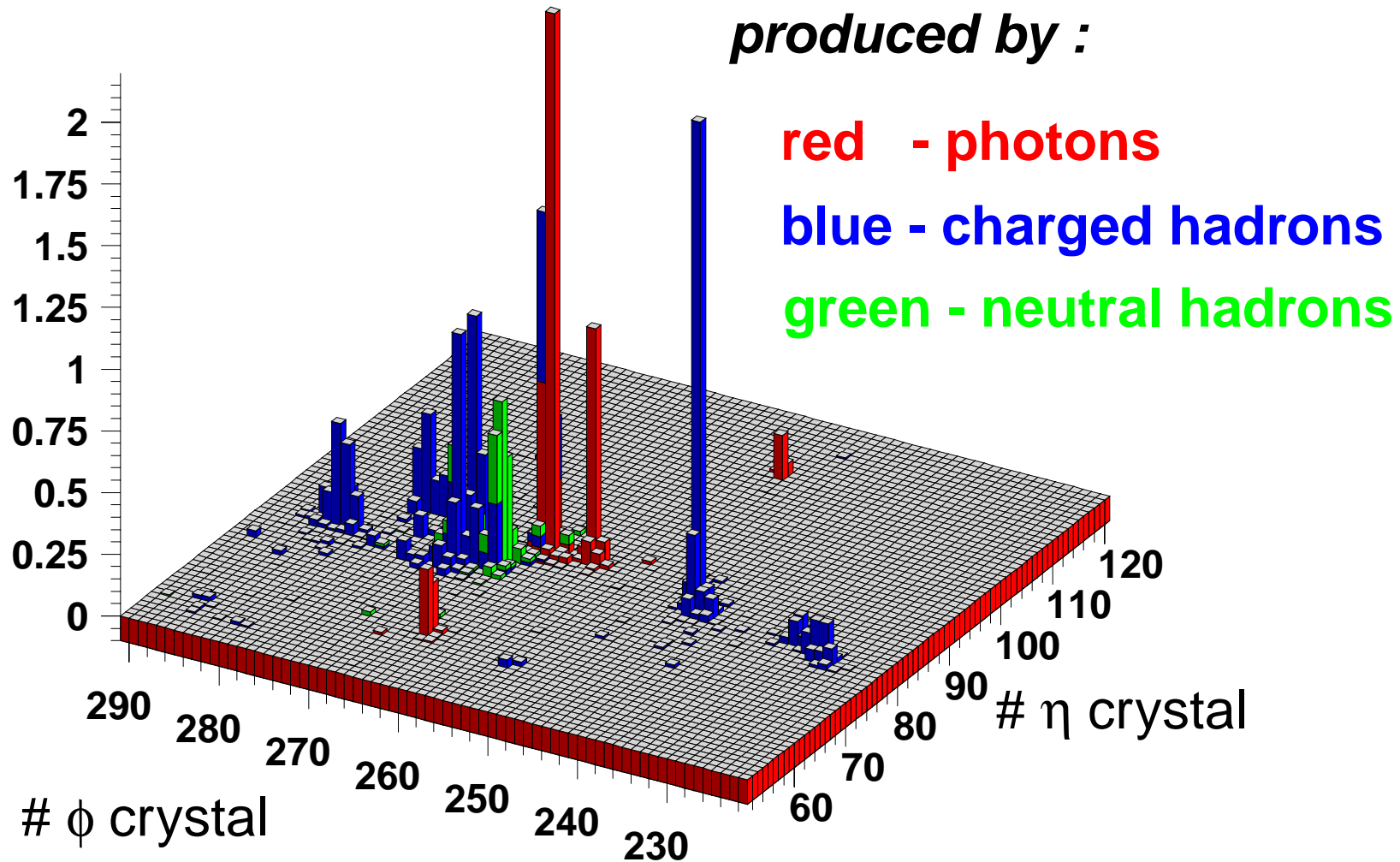


example I. Jet $E_t=45$ GeV. Impacts in ECAL surface



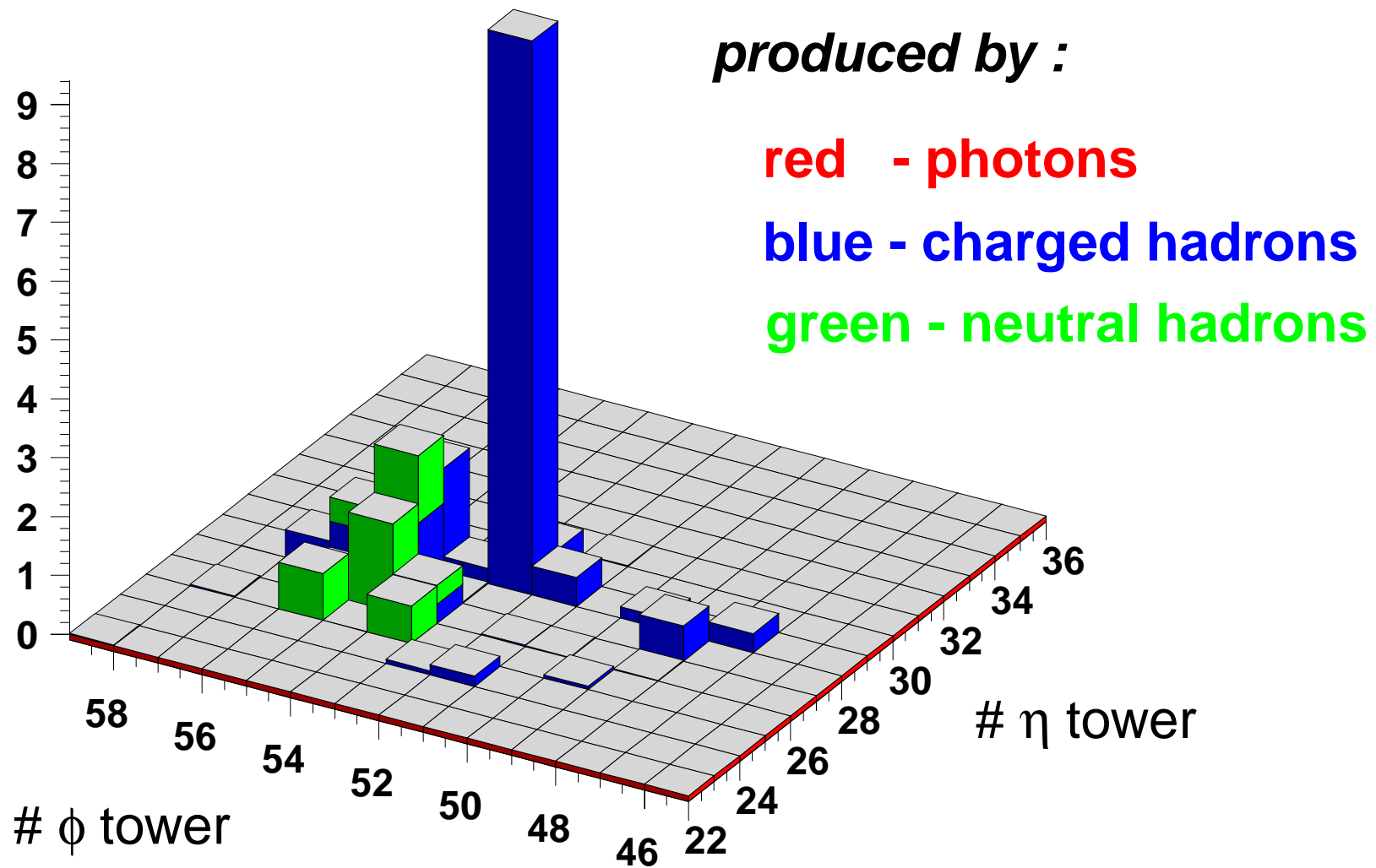


example I. Jet $E_t=45$ GeV. Energy in ECAL





example I. Jet $E_t=45$ GeV. Energy in HCAL





Conclusion

❑ Step 1 works and improve resolution for low E_t jets
Still has to be checked with “reconstructed” tracks

❑ Step 2 : looks like some calo clusters in jet can be separated and replaced by tracks.

CDF, ZEUS, TESLA, LEP are doing this.

Dan's energy flow results are promising.

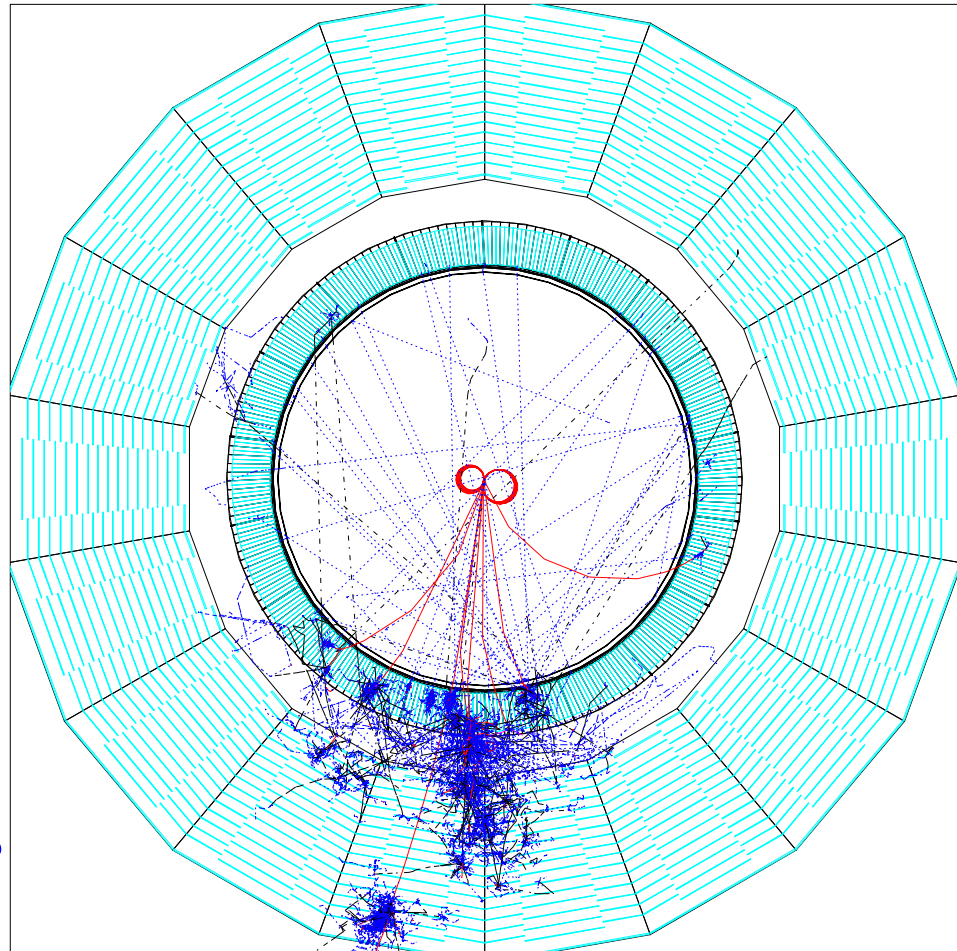
Irina&Olga results on overlapping clustes are promising

let's improve resolution !

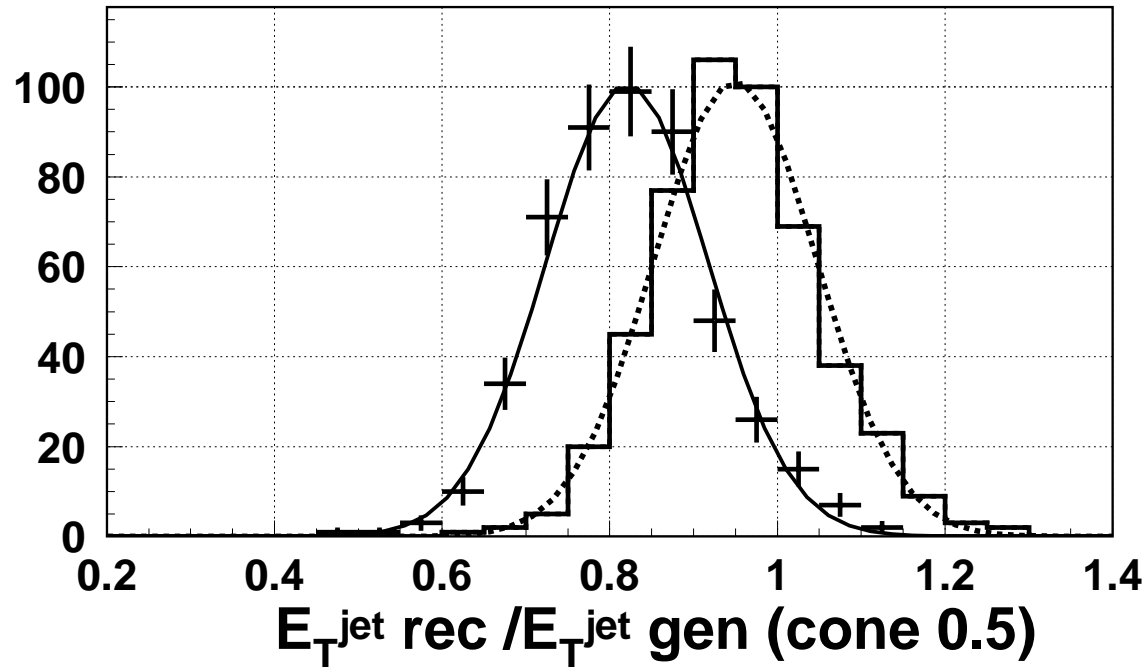
□ Step 3 (Irina & Olga) : work with overlapping clusters
*for overlapping clusters substruct expected response
of matched charged tracks and add Σp_t of a such tracks*

in Fig. core of the jet is
produced by neutron ,
charged pions and π^0 's;
Not possible to resolve
averlapps. Do Step 3.

Expected response of
charged tracks (π^{+-}) can
be taken from test beam
or from isolated min.bias
tracks



Present results of Irina & Olga : Step 3 applied for the whole Jet :
 expected response of all tracks with impact in reco cone
 is substructed from calo jet energy and Σp_t^{trk} (MC) of a
 such tracks is added.

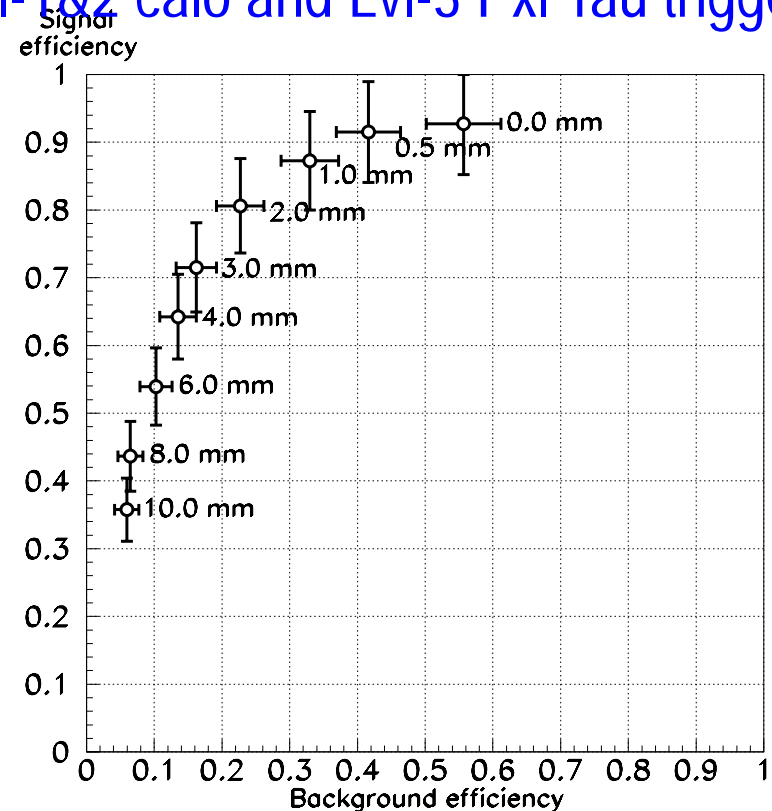
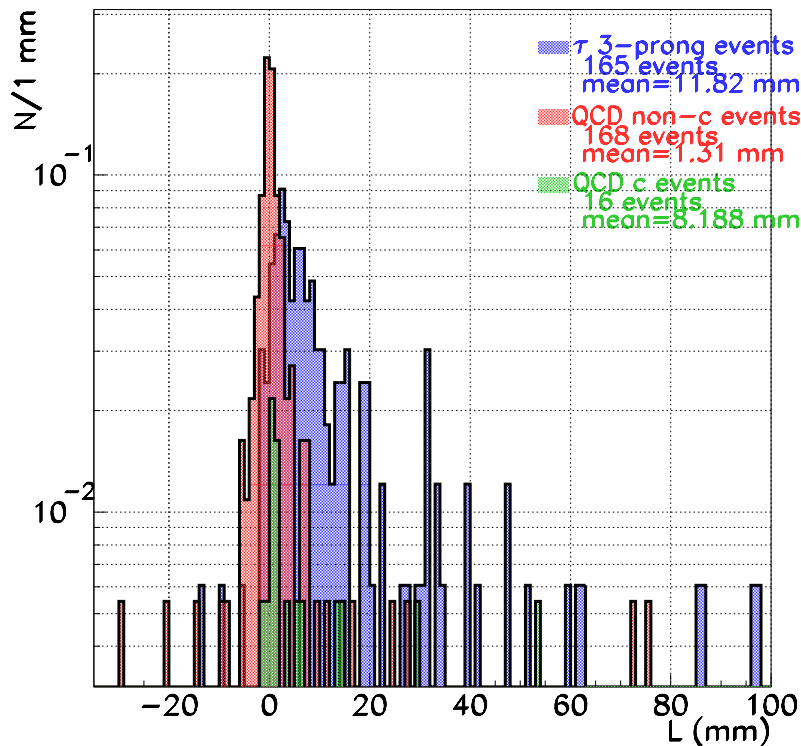


	$R = \langle E^{\text{reco}} / E^{\text{MC}} \rangle$	$\sigma(R)$	$\sigma(R) / R$
calo	0.821	0.097	11.8 +- 0.5 %
calo+tracks	0.950	0.097	10.2 +- 0.5 %



3-prong tau-id with vertex *

preliminary results obtained by L. Wendland (HIP) for $L=10^{34} \text{ cm}^{-2} \text{ s}^{-1}$
qcd and $h \rightarrow 2\text{tau} \rightarrow 2j$ events passed Lvl-1&2 calo and Lvl-3 Pxl Tau triggers



fraction of c quarks ~ 8.0 % is not sensitive to HLT selections

*Linear Vertex Fitter by V. Karimaki (CMS Note 1997/051) and P. Vanlaer